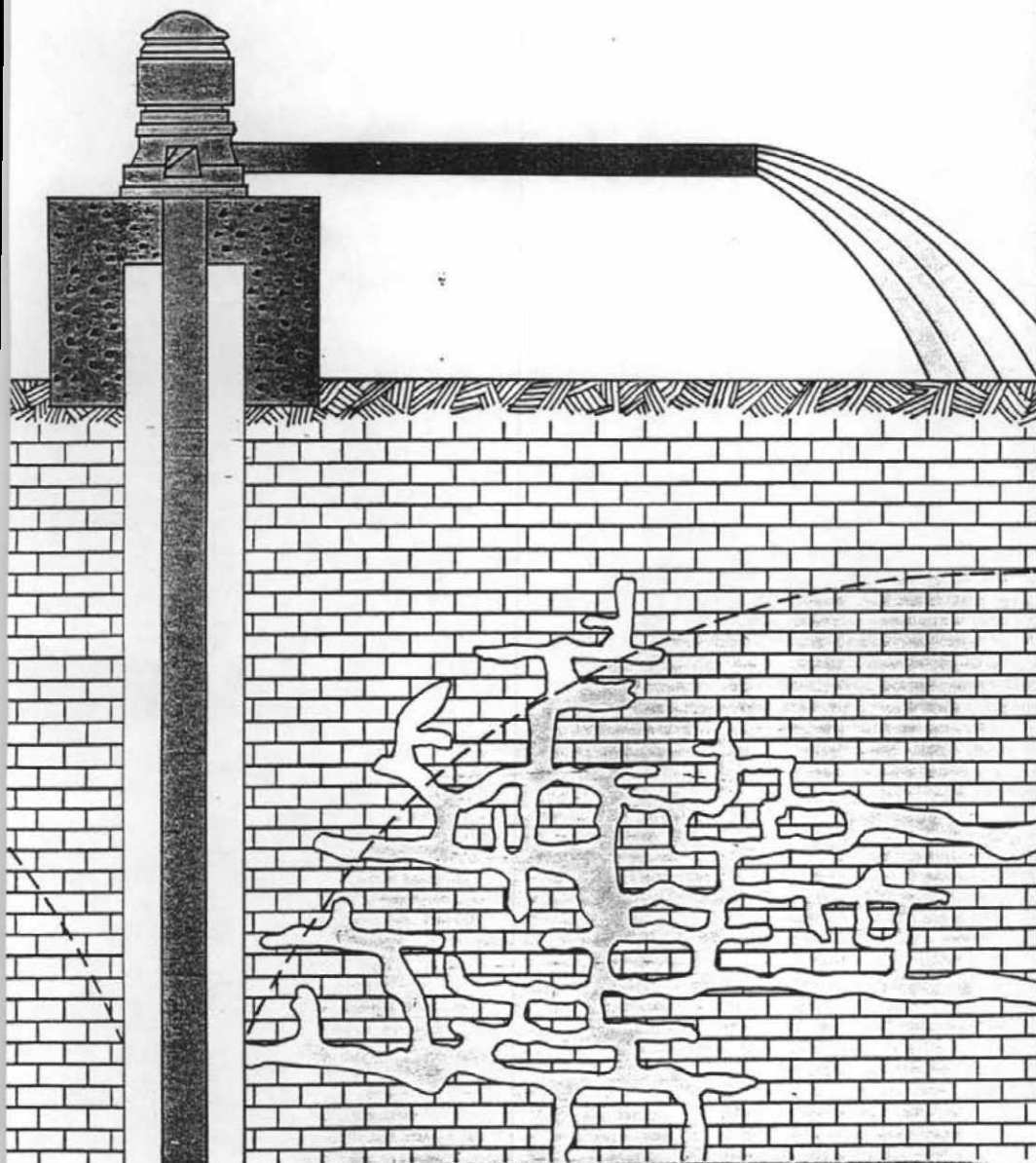


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**GROUND-WATER RESOURCES OF THE  
BIRMINGHAM AND CAHABA VALLEYS,  
JEFFERSON COUNTY, ALABAMA**

GEOLOGICAL SURVEY OF ALABAMA

CIRCULAR 103



**GEOLOGICAL SURVEY OF ALABAMA**

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**CIRCULAR 103**

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AND CAHABA VALLEYS OF  
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by

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Prepared in cooperation with the City of Birmingham and Jefferson County

University, Alabama  
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# CONTENTS

	Page
Abstract .....	1
Introduction .....	3
Purpose and scope .....	3
Location and physiographic setting .....	3
Climate .....	5
Previous investigations .....	5
Methods of investigation .....	5
Acknowledgments .....	6
Geology .....	7
Stratigraphy .....	7
Cambrian System .....	7
Rome Formation .....	7
Conasauga Formation .....	7
Ketona Dolomite .....	7
Knox Group undifferentiated .....	8
Ordovician System .....	8
Ordovician limestones undifferentiated .....	8
Chickamauga Limestone, Attalla Chert Conglomerate Member .....	8
Chickamauga Limestone .....	8
Silurian System .....	9
Red Mountain Formation .....	9
Devonian System .....	9
Frog Mountain Sandstone and Chattanooga Shale .....	9
Mississippian System .....	9
Maury Formation, Fort Payne Chert, and Tuscumbia Limestone .....	9
Pride Mountain Formation .....	10
Hartselle Sandstone .....	10
Bangor Limestone .....	10
Floyd Shale .....	11
Mississippian and Pennsylvanian Systems .....	11
Parkwood Formation .....	11
Pennsylvanian System .....	11
Pottsville Formation .....	11
Upper Cretaceous System .....	12
Tuscaloosa Group .....	12
Coker Formation .....	12
Quaternary System .....	12
Quaternary? gravels .....	12
Alluvium and low terrace deposits .....	12
Structure .....	13
Hydrology .....	13
Hydrologic cycle .....	13
Ground-water occurrence .....	15
Ground water-surface water relationships .....	20
Ground-water use in the Birmingham and Cahaba Valleys .....	21

# CONTENTS

	Page
Ground-water discharges in the Birmingham and Cahaba Valleys .....	22
Wells .....	29
Depths .....	29
Yields .....	31
Casing .....	37
Water-bearing characteristics of the aquifers .....	37
Conasauga Formation .....	37
Ketona Dolomite .....	39
Knox Group undifferentiated .....	40
Ordovician Limestones undifferentiated .....	41
Chickamauga Limestone .....	41
Fort Payne Chert - Tusculumbia Limestone .....	41
Hartselle Sandstone .....	42
Bangor Limestone .....	44
Water quality .....	45
Advantages of using ground water .....	52
Ground-water management .....	54
Summary and conclusions .....	55
Bibliography .....	57
Basic data .....	59
American measures and metric equivalents .....	79

## ILLUSTRATIONS

(Plate in pocket)

Plate 1. Map showing locations of selected wells and springs in the Birmingham and Cahaba Valleys of Jefferson County.

## FIGURES

Figure 1. Index map showing the study areas and related physiographic and structural features .....	4
2. The hydrologic cycle .....	14
3. Rock interstices and the relation of rock texture to porosity .....	16
4. Diagrammatic illustration of the occurrence of water-table and industrial wells in the Birmingham and Cahaba Valleys .....	30
8. Frequency graph of depths reported for 67 drilled domestic wells in the Birmingham and Cahaba Valleys .....	32
9. Frequency graph of yields reported or measured for 27 drilled domestic wells in the Birmingham and Cahaba Valleys .....	33
10. Frequency graph of specific-capacity data for 18 domestic wells in the Birmingham and Cahaba Valleys .....	35
11. Frequency graph of reported yields for 43 municipal and industrial wells in the Birmingham and Cahaba Valleys .....	36
12. Frequency graph of reported casing depths for 52 domestic wells in the Birmingham and Cahaba Valleys .....	38
13. Frequency graph of reported yields for 18 municipal and industrial wells in the Fort Payne Chert-Tuscumbia Limestone aquifer in the Birmingham and Cahaba Valleys .....	43
14. Relationship of dissolved-solids concentration to specific conductance (field) of water samples from carbonate aquifers in the Birmingham and Cahaba Valleys .....	49
15. Graph of water hardness ranges suitable for various uses and the percent of water samples from wells and springs in the Birmingham and Cahaba Valleys suitable for each use .....	50
16. Relationship of hardness, as $\text{CaCO}_3$ , to specific conductance (field) of water samples from carbonate aquifers in the Birmingham and Cahaba Valleys of Jefferson County .....	51

## TABLES

(Tables 1 and 2 in Basic Data Section)

Table 1. Records of selected wells and springs in the Birmingham and Cahaba Valleys .....	60
2. Chemical analyses of water from selected wells and springs in the Birmingham and Cahaba Valleys .....	76
3. Current major ground-water withdrawal rates from wells inventoried in the Birmingham and Cahaba Valleys .....	23
4. Summary of discharge data for springs inventoried in the Birmingham and Cahaba Valleys .....	25
5. Summary of chemical and physical characteristics of ground water from aquifers in the Birmingham and Cahaba Valleys .....	46
6. Summary of nitrate-nitrogen analyses of water samples from wells and springs in the Birmingham and Cahaba Valleys .....	47
7. Relative advantages and disadvantages of ground-water and surface-water supplies .....	53



## STRUCTURE

The structural geology of the areas of investigation is complex and distinctly affects the occurrence of ground water in some areas. The study areas contain a series of anticlines and synclines that have parallel thrust faults and high-angle cross faults (fig. 1). The Birmingham-Big Canoe Valley is developed upon a faulted asymmetrical anticlinorium that exposes limestones, dolomites, shales, sandstones, and cherts (Johnston, 1933). Many of the geologic formations dip steeply into the subsurface as a result of the intense folding. A large amount of faulting and jointing associated with the folding of the rocks has displaced and broken the rocks in many areas. This has resulted in increased solution and porosity of the rocks. The faults can adversely affect water-well development because the broken zones in and near the faults may produce large amounts of sediment. Careful selection of test drilling sites near fault zones is warranted.

## HYDROLOGY

### HYDROLOGIC CYCLE

Precipitation, surface runoff, evapotranspiration, and ground-water recharge and discharge are major components of the hydrologic cycle (fig. 2). Through this cycle, and as a result of natural processes, water can be continuously purified and used by plants and animals without depleting the supply. The oceans are the primary reservoir that supplies and receives the enormous quantities of water involved in the hydrologic cycle. The recycling of this water to and from the ocean results from forces exerted predominantly by the sun's energy and the earth's gravity. In general, the sun supplies energy to evaporate water from the ocean. This water rises as a vapor into the atmosphere where it forms clouds. Eventually, this moisture moves over the land, condenses, and falls back to the earth in some form of precipitation. Responding to gravity, this precipitation then begins a slow but constant movement through the surface- and ground-water systems back toward the ocean.

In Jefferson County, an average of 53 inches of precipitation, usually rain, falls on the land surface each year. This 53 inches of rain falling upon the 1,120 square miles in Jefferson County is equal to about 138 billion cubic feet or slightly more than 1 trillion gallons of water each year. Not all of this water is available for man's use because of the requirements of the other components of the hydrologic cycle. A